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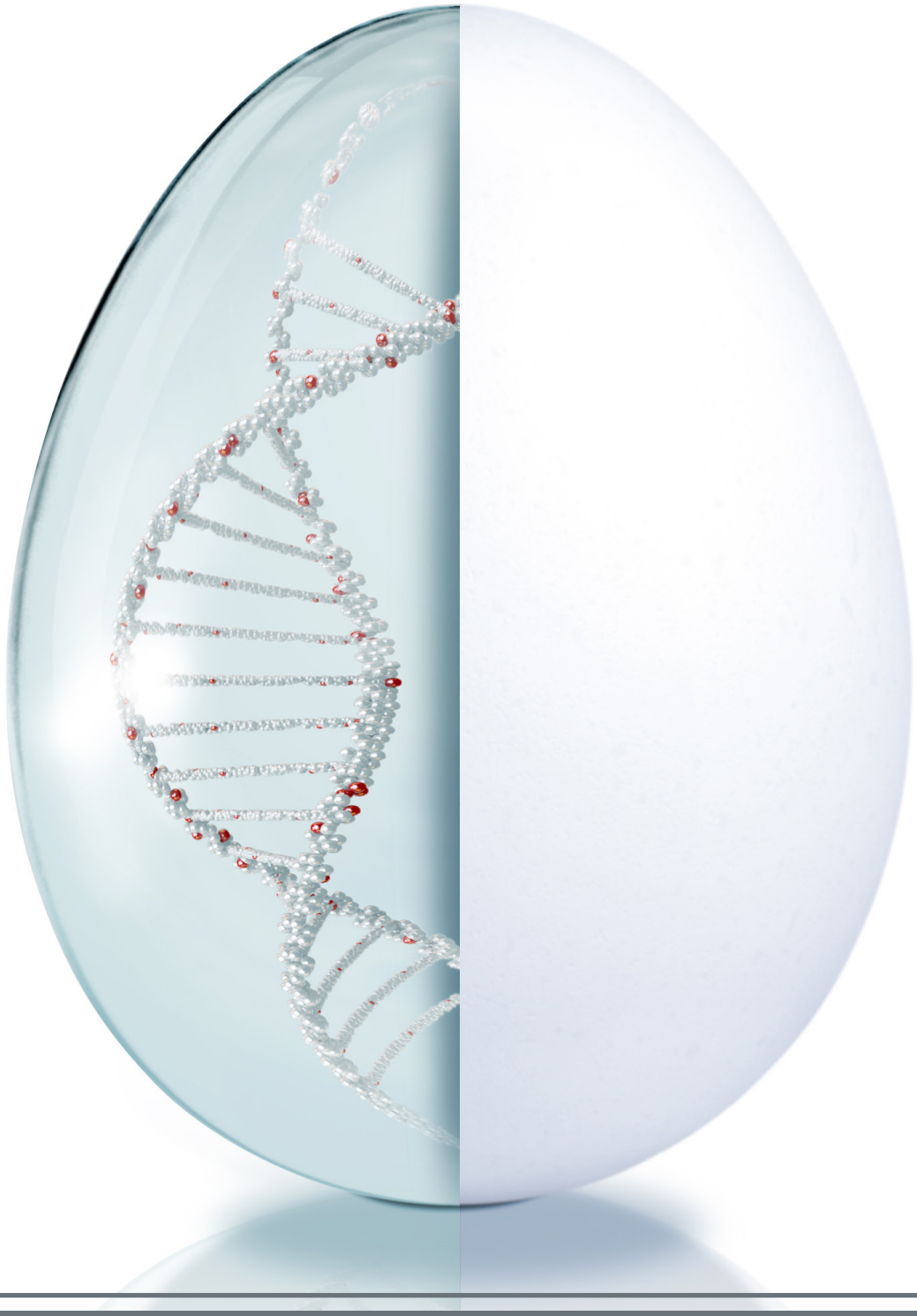

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BREEDING FOR SUCCESS … TOGETHER

LOHMANN TIERZUCHT

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Performance of current Peking duck breeds

Abstract

Data on the performance of commercial ducks are rare and outdated in most cases. It was the objective of the present test to explore the performance criteria and carcass characteristic of commonly used duck breed. The results may be used as up-to-date reference values. A total of 2380 ducks of 5 different breeds were raised from day-old to 42 days of age. The birds were fed a 3-phase feeding program. Body weight and feed consumption were recorded in weekly intervals. Mortality was recorded daily. Samples of all breeds were slaughtered at 36, 40 and 42 days of age. Slaughter weight and percentage of different parts of the carcass were determined. Pooled means and minimum/maximum values are shown of the present experiment. Data of earlier performance tests (2004 and 2008) are reported to show the temporal changes. At the end of the test (42 days) live weight was 3.6 kg and feed conversion rate 2.03. The ducks reached 3 kg live weight at 36 days of age, 10 and 8 days earlier than in 2004 and 2008. Daily weight gain was 85 g and feed conversion rate 1.8 kg/kg. Percentage of the breast including skin increased from 20.7 % at 36 days to 23.8 % at 42 days. The range of minimum and maximum values was high for all criteria. Mortality from day 7 to 42 was 2.8 %. Compared with data of 2008 there was an annual improvement in slaughter age of – 0.8 days; in daily weight gain of +1.65 g and feed conversion rate of -0.05 kg feed/kg gain. The European Production Index (EPI) and Income Over Feed Cost (IOFC) were calculated for 36, 40 and 42 days of age. Higher slaughter age showed positive economic effects in some lines. The increase in feed conversion rate was obviously balanced by the increased growth rate of the breast muscle. Range of the means, however increases with slaughter age. Optimum age at slaughter will vary in response of the particular characteristics of the breed.

Keywords

Pekin ducks, growth rate, feed conversion, slaughter age, slaughter yield, economics

Indroduction

Planning and calculation of facilities for duck production require reliable basic biological data including growth rate, feed intake, feed conversion rate. These data are also important to appraise the environmental aspects of duck production. The existing data material on duck production is outdated. The last information of the experimental station LVFZ (Lehr-, Versuchs- und Fachzentrum für Geflügel- und Kleintierhaltung, Mainbernheimer Str. 101, 97318 Kitzingen; Germany) on this subject has been published in 2008. There is considerable genetic progress in the performance, feed intake, feed conversion and criteria of the slaughtered birds of commercial duck breeds. It was the objective

Table 1: Nutrients (% of fresh matter) of the starter (day 1 – 14), grower (day 15 – 28) and finisher (day 29 – 42)

	Starter	Grower	Finisher
Crude protein (%)	21,5	14,6	17,5
Crude fat (%)	3,5	3,1	3,5
Crude fibre (%)	2,7	4,8	3,2
Ash (%)	6,1	4,9	4,5
Calcium (%)	1,00	0,85	0,80
Phosphorous (%)	0,65	0,50	0,55
Sodium (%)	0,16	0,18	0,18
Lysine (%)	1,40	0,81	1,10
Methionine (%)	0,60	0,43	0,50
ME (MJ/kg)	12,0	11,5	12,3

Table 2: Means and minimum/maximum across breeds of body weight, cumulated feed and water intake and feed conversion rate from day old to 42 days of age.

Age (days)		Body weight (g)	Feed intake (g)	Water intake (ml)	Feed conversion (kg/kg)
0	x	51.4			
7	x	257	225	566	1.09
	min / max	251 - 275	212 - 252	490.8 - 646.8	1.04 - 1.17
14	x	758	813	2.196	1.15
	min / max	728 - 821	763 - 963	2.067 – 2.479	1.11 - 1.25
21	x	1.393	1.890	4.897	1.41
	min / max	1.353 – 1.497	1.744 – 2.086	4.588 – 5.655	1.31 - 1.44
28	x	2.132	3.345	8.341	1.60
	min / max	2.052 – 2.338	3.093 – 3.763	7.648 – 9.609	1.54 - 1.64
36	x	3.055	5.409	13.628	1.80
	min / max	2.955 – 3.189	4.965 - 6168	12.469 – 16.034	1.77 - 1.96
40	x	3.442	6.637	16.729	1.95
	min / max	3.341 – 3.519	6.093 – 7.457	15.253 – 19.482	1.81 - 2.17
42	x	3.608	7.215	17.991	2.03
	min / max	3.522 – 3.707	6.642 – 8.044	16.512 – 20.846	1.88 - 2.29

of the LVFZ to actualize, in cooperation with MEGA animal nutrition and Duck-Tec Hatchery, the above mentioned criteria of five different commercial duck breeds so as to update the data base for duck producers and governmental authorities.

Birds, material and methods

A total of 2380 ducks of 5 different breeds (Cherry Valley, Maple Leaf, Wichmann, Grimaud Frères and Orvira) were used. Day-old ducklings were housed in floor pens on straw as litter. The experimental house was windowless and force-ventilated. Stocking density was 6 birds/m^2. The birds were fed a 3-phase programme (MEGA Animal Nutrition, 49429 Visbek, Germany) as shown in **table 1**. Starter was fed from day 0 to 14, grower from day 15 to 28 and finisher from day 29 to 42. Body weight and feed consumption were recorded on day 0, 7, 14, 21, 28, 36, 40 and 42. Mortality was recorded daily. Slaughter yield was determined using samples at 36, 40 and 42 days of age. Slaughter weight and the percentage of valuable parts were recorded. The birds were healthy throughout the experiment and no veterinary intervention was necessary.

Results and Discussion Performance

The performance data across the five different breeds are shown in **table 2**. The development of the main performance criteria from 2004 to 2018 are provided in **table 3** for reference. Data from 2008 and 2004 stem from earlier tests under practical conditions and are not directly comparable with the results of the present (2018) station test. The mean daily weight gain and feed conversion rate in 2008 were 68.4 g and 2.32 kg/kg respectively, and in 2004 65.2 g and 2.5 kg/kg resp. The birds reached the slaughter weight of 3.0 kg at 44 days of age in 2008 and at 46 days in 2004. In the present experiment the slaughter weight (3.055 kg) was reached at 36 days of age. Besides the increase of growth rate the feed conversion rate was improved from 2.5 in 2004 to 1.8 in 2018. The annual change during the 10 years from 2008 to 2018 was -0.8 days in slaughter age, +1.65 g in daily weight gain and -0.05 in feed conversion rate. This corresponds to savings of about 150 g feed per duck which represents a considerable improvement of the use of resources and reduction of resource based

Table 3: Development of main performance criteria in 2004, 2008 and 2018 tests and difference between 2008 and 2018

Criteria	2004 *	2008 **	2018	Δt / Jahr
Live weight (kg)	3,0	3,0	3,1	
Age at slaughter (d)	46	44	36	- 0,8
Daily weight gain (g)	65,2	68,4	84,9	+ 1,65
Feed conversion rate (kg/kg)	2,50	2,32	1,80	- 0,052

* Source: S. Graser et al. (2004)
** Source: A. Tischler et al. (2008)

Table 4: Means and min/max values for mortality, European Production Index (EPI), and Income over feed cost (IOFC) from 7 – 36, 40 and 42 days of age

Age (days)		Mortality (%)	EPI (Units)	IOFC (€ / bird)
7-36	x	2,0	449	2,12
	min / max		426 – 466	2,04 - 2,19
7-40	x	2,2	419	2,23
	min / max		377 – 445	2,05 - 2,34
7-42	x	2,8	402	2,27
	min / max		349 – 433	2,00 - 2,40

Early mortality from day 1 to 6 was 2.9%

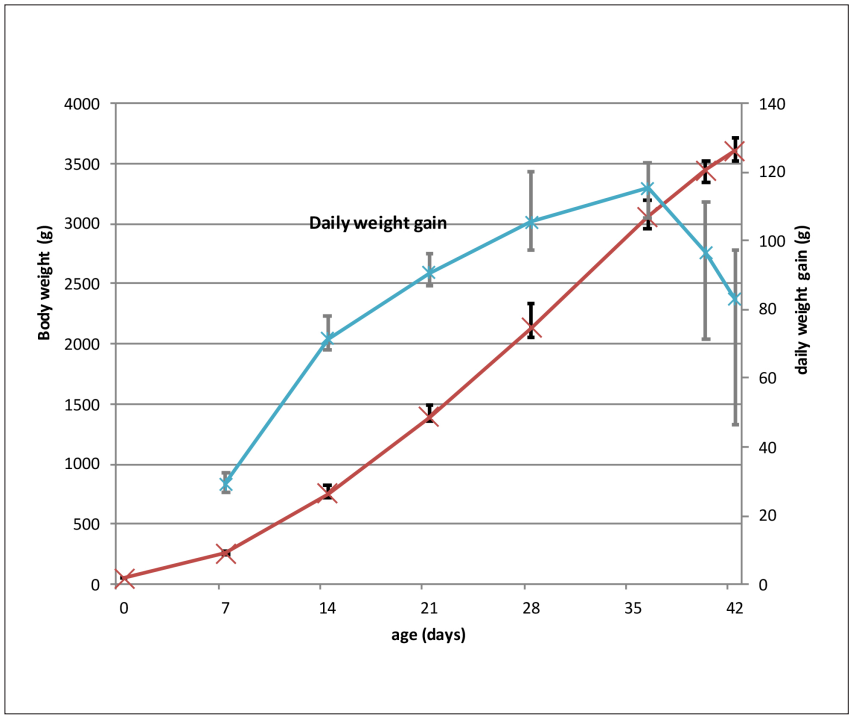

Figure 1 Means (all breeds) and SD of body weight development from day-old to 42 days of age

environmental problems. Figure 1 shows the change of body weight and feed conversion rate over the growth period from day-old to 42 days of age. Body weight follows a normal growth curve for ducks with a sharp increase from day 7 onwards (Figure 1). Daily weight gain increased about 27 g at day 7 to 110 g at 35 days of age. Thereafter daily weight gain is falling towards 80 g at 42 days and the Standard Deviation increases considerably. The increased variation in daily weight gain is probably caused by the sex and breed effect which is gaining momentum with increasing age. It has to be mentioned that in the present study the performance results have been produced under standardized conditions of a research station. The feeding program of the present study was not conceived to achieve highest growth rate. Using

Table 5: Means (across all breeds) and min/max of slaughter weight (g), slaughter yield (%) and for different parts (in g and in % of slaughter weight) of the birds at 36, 40 and 42 days of age

Age (days)		36	40	42
Slaughter weight (g)*	x	2.080	2.409	2.532
	min / max	1992 - 2177	2298 - 2485	2443 - 2590
Slaughter Yield (%) **	x	68,6	69,9	70,6
	min / max	66,8 - 70,1	68,6 - 71,4	69,3 - 72,5
Breast with skin (g)	x	435	559	607
	min / max	335 - 535	447 - 654	526 - 673
Breast skin (%)	x	20,7	23,0	23,8
	min / max	16,6 - 24,5	19,2 - 26,3	20,7 - 26,6
Thigh (g)	x	523	569	585
	min / max	498 - 542	548 - 581	547- 616
Thigh (%)	x	25,2	23,7	23,2
	min / max	498 - 542	548 - 581	547- 616
Wings (g)	x	292	343	360
	min / max	281 - 301		343 - 377
Wings (%)	x	14,1	14,0	14,3
	min / max	13,8 - 14,5	13,7 - 14,9	13,7 - 14,6
Carcass (g)	x	733	847	884
	min / max	705 - 749		854 - 919
Carcass (%)	x	35,3	35,2	35,0
	min / max	34,2 - 37,2	33,7 - 37,4	34,0 - 36,2
Liver (g)	x	84,2	83,5	82,8
	min / max	77,7 - 90,0	76,7 - 87,4	74,5 - 91,2
Liver (%)	x	4,1	3,5	3,3
	min / max	3,9 - 4,4	3,3 - 3,8	3,0 - 3,6
Heart (g)	x	15,6	16,0	17,2
	min / max	14,3 - 18,0	14,1 - 18,2	15,9 - 19,0
Heart (%)	x	0,75	0,66	0,68
	min / max	0,69 - 0,91	0,57 - 0,75	0,62 - 0,78
Gizzard(g)	x	44,6	50,1	50,9
	min / max	37,6 - 53,1	39,3 - 58,6	38,1 - 57,8
Gizzard (%)	x	2,2	2,1	2,0
	min / max	1,7 - 2,6	1,6 - 2,5	1,5 - 2,3

* slaughtered, with neck, without feathers, head, inner organs and paddles
** slaughter weight in paercent of live weight (measured immediately before slaughter)

common commercial duck diets would have given higher growth rates, but on the expense of the bird`s health.

Economics

Table 4 shows means and range of mortality, European Production Index (EPI) and Income Over Feed (IOFC) over the growing periods from 7 to 36, 7 to 40 and 7 to 42 days. The EPI is calculated according to the following formula:

$$EPI = \frac{\text{survivability (\%)} * \text{daily weight gain (g)}}{\text{feed conversion rate (kg of feed per kg of weight gain)}} * 10$$

The assumed feed price for the calculation of IOFC was 27 €/dt and price for the ducks was 1.17€ per kg live weight. The EPI was nearly 450 from day 7 to 36. This corresponds to the average EPI in broilers. Despite higher growth rate of the ducks from day 36 onwards there is a sharp reduction in mean EPI: 419 and 402 when slaughter age increased to 40 an 42 days **(table 4; figure 2).** Since mortality was generally low, this is mainly due to the deterioration of feed conversion with increasing age. The high range however shows that there exists potential for further improvement. Some groups showed an EPI which was substantially higher than 450 from day 7 to 36, and of 450 from 7 to 40 days of age. In contrast to EPI the mean IOFC increased from 36 to 42 days of slaughter age. The difference between the minimum and maximum values increases with from 0.15 to 0.29 and 0.40 € as slaughter age increased from 36 to 40 and 42 days. The development of the minimum and maximum values shows that the increase in IOFC with increasing slaughter age is mainly supported by the groups of maximum economic result. The minimum values show a small negative trend in response to slaughter age.

Slaughter yield

Criteria of the slaughtered birds in response to increased slaughter age are shown in

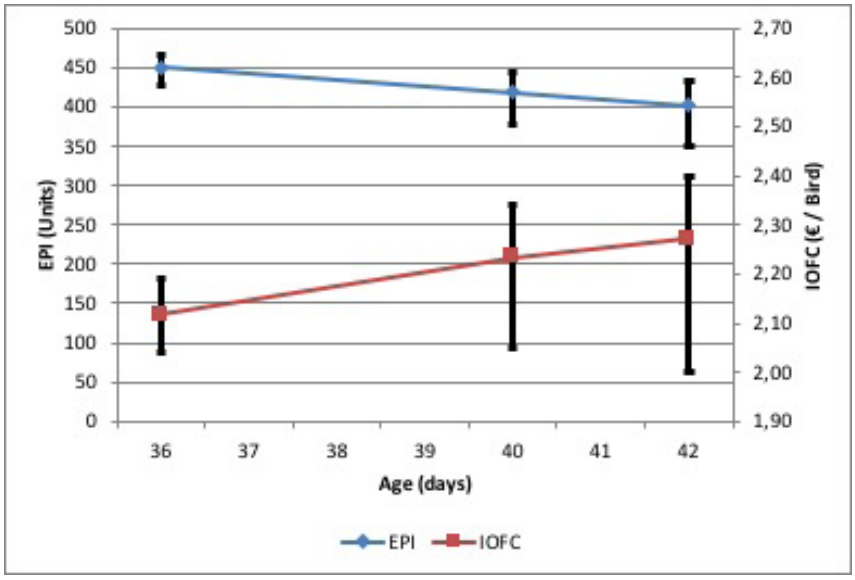

Figure 2: Means (across all lines) and SD of the European Production Index (EPI) and Income Over Feed Cost (IOFC) from day 36 to 42

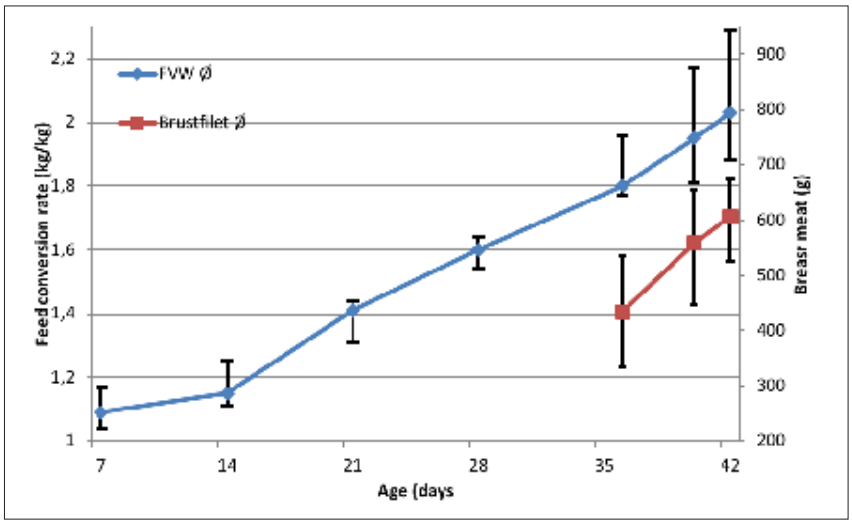

Figure 3: Development of breast meat (g) from 36 to 42 days and feed conversion rate from 7 to 42 days of age

table 5. Mean slaughter weight increased in response to slaughter age from 2080 to 2409 and 2532 g. The difference between minimum and maximum values decreased with slaughter age. Slaughter yield increased with slaughter age from 68.6 to 70.6 %. The improvement in slaughter yield was mainly supported by the increase of the valuable cuts. From slaughter age 36 to 42 days the weight of breast with skin increased from 435 (20.7%) to 607 g (23.8 %). Here again there exist extremely high differences between the minimum and maximum values, from 16.6 to 24.5 % at 36 days and 20.7 to 26.6 % at 42 days. The breast meat yield from day 36 to 42 is plotted against the feed conversion rate in figure 3. The increase of breast meat yield from day 36 to 42 is higher than the decrease in overall feed conversion. This leads to an improvement of the feed efficiency related to breast meat yield. 12.7 kg of feed is required to produce one kg of breast meat at day 36. This ratio is reduced to 12.0 kg at day 42. Breast meat is of particular importance as the demand for this valuable part is increasing among the consumers in Europe. As shown in figure 3 the development of the breast muscle starts relatively late in the growing period. It is therefore advised to consider this when formulating the finisher diet. In contrast to broiler, the level of crude protein in the finisher diet of ducks has to be increased at the end of the growing period so as to allow optimum growth of breast meat.

The percentage of other parts did not show great changes with increasing slaughter age. There are tendencies of relative decrease for thigh, liver, heart and gizzard.

Conclusions

The present data provide information on the state of productivity of the actual commercial duck breeds. The results of a performance test of 5 different breeds show a considerable progress in body weight gain, feed conversion rate, slaughter yield and breast meat yield, when compared with data from earlier tests. There exists a high variation among breeds. Consequently the most economic age of slaughter may vary depending on growth rate and breast meat yield. Under practical conditions other aspects, such as feather cover and its influence of plucking, health and mortality have also to be considered.

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NOTES